EPA Region 7 TMDL Review

TMDL ID: IA 04-RAC-00805-L_0 **Water Body ID:** IA 04-RAC-00805-L_0
Water Body Name: Spring Lake

Tributary: Spring Lake
Pollutant: Non-algal turbidity
State: Iowa **HUC:** HU8 07100006
BASIN: North Raccoon River Basin
Submittal Date: January 26, 2006
Approved: Yes

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

A letter formally submitting this TMDL under Section 303(d) of the Clean Water Act was received on January 26, 2006.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

The State of Iowa does not have numeric water criteria for turbidity that pertains to this situation. The turbidity impairment at Spring Lake is due to re-suspension of lake bottom sediment by common carp and other bottom dwelling fish foraging activity, causing excessive turbidity and limiting the transparency of the water. The sediments are a combination of inorganic suspended solids (non-algal turbidity) and from volatile suspended solids (organic matter).

Spring Lake has been identified as impaired by non-algal turbidity. The purpose of the TMDL for Spring Lake is to calculate the maximum allowable non-algal loading that will meet water quality standards and fully supports its designated uses. The water quality impairment will be addressed by using transparency as measured by Secchi Depth (SD) measurements as the target. The transparency objective is defined by a mean SD of 0.7 meters or Trophic State index (SI) of 65. The TSI is not a standard, but is used as a guideline to relate SD (transparency) to the turbidity impairment for TMDL development purposes and to describe water quality that will meet Iowa's narrative water quality standards.

The load capacity (LC) is defined as the greatest amount of loading of a pollutant that a water body can receive without violating water quality standards. This load is then divided among the point source (waste load allocation) and nonpoint source (load allocation) contributions to the lake, with allowance for a margin of safety. Load Capacity = Waste Load allocation + Load Allocation + Margin of Safety. The loading resulting in attainment of Turbidity criterion were modeled based upon meeting a (SD) if 0.7 meters which corresponds sediment load of 124 tons per year.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

All designated beneficial uses are describe as well as the pertinent narrative expression that is site specific for Spring Lake and interprets the narrative WQS.

Phase I targets for this phased TMDL are established based on
improving the lake's trophic state to correspond to a Trophic State Index (TSI) value, which corresponds to a Secchi Depth of 0.7m. A Secondary target is the attainment of aquatic life uses as measured by fisheries and biological assessments determined by the IDNR Fisheries Bureau.

Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The State of Iowa does not have numeric criterion for turbidity in their WQS, however, the lake violated the narrative WQS that states, "water shall be free" from aesthetically objectionable conditions. The aesthetically objectionable condition present at Spring Lake is impairing the Class A1 use for primary contact recreation. The TMDL uses the surrogate measure of TSI which links turbidity conditions to aquatic health.

Excessive levels of total suspended solids (TSS) are causing the turbidity impairment. The loading capacity of the lake is determined by a Secchi depth TSI of 65, equivalent to a Secchi depth (SD) of 0.7 meters. The Iowa state University Lake data collected from 2000-2004 were evaluated using an inverse transformation of the total suspended solids (TSS) and SD annual means to back-calculate the sediment load. Turbidity levels in Spring Lake are created by an existing sediment load of 186 tons re-suspended in the lake. This is calculated using lake hydrology, measured TSS and dam trapping efficiency.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Spring Lake originated as a sand and gravel pit that was not mined out, although certain portions were originally about 30 feet deep. Over time, the sand and gravel walls in the lake have caved-in, filling in the lake to its present shallow depth. The lake is known to be spring-fed from the bottom that does not receive inflow from an inlet stream.

Land use has remained steady over the past ten years with the exception of some increase in wooded and vegetative cover in the western portion of the park. There are no confined animal feeding operations or open feedlots existing in the watershed.

In Spring Lake, the lake's small size limits the amount of lakebed disturbance from boats higher dikes and woods' surrounding the lake reduces the amount of wind reaching the lake. Therefore, the stirring of sediment and resuspension in the lake is nearly exclusively caused by common carp and other bottom-dwelling fish foraging activity, causing excessive turbidity.

The lake itself has characteristics that hinder improvement of water quality. The shallow nature of the lake prevents the upper levels of the water from clearing and returning to acceptable levels of transparency. The sediment load capacity is 124 tons of sediment. The existing sediment load is 186 tons resulting in a departure from load capacity of 62 tons of sediment.

Background levels of sediment were not separated from nonpoint sources of sediment. Transparency is measured by Secchi depth is a function of inorganic and organic components. Sediment will have to be decreased by 62 tons to meet the transparency target of 0.7 meters Secchi depth.

There are no point sources of pollution in Spring Lake watershed and no input stream. Therefore, all of the turbidity is attributed to internal loading. All significant sources have been considered at this time.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

There are no point sources of pollution in the Spring Lake Watershed and no input stream. Therefore, all of the turbidity is attributed to internal loading. The inorganic and organic turbidity is caused by the internal re-suspension of sediment and residue from the lake bottom. There is a large population of lake bottom foraging fish, specifically grass and common carp and catfish. Since dikes run parallel along the east and west sides of the lake, surface runoff sediment from sheet and rill erosion from cropland does not occur. There are two tile outlets inside the park. One tile does not flow and is considered nonfunctioning. The other tile outlet is observed to flow only on a few occasions, and carries sediment free water that filters through riparian vegetation. The waste load allocation for this TMDL is set at zero.

The current turbidity load is 186 tons/year. The load capacity established to support the targeted endpoint is 124 tons/year of sediment in the lake allocated to lake re-suspension.

WLA Comment

No point sources have been identified in the Spring Lake watershed. Therefore, the waste load allocation will be set at zero tons per year.

LA Comment

The sediment load capacity is 124 tons. The existing sediment load is 186 tons resulting in a departure from load capacity of 62 tons.

Load allocation (LA) from nonpoint source for sediment is 112 tons of sediment in the lake allocated to lake re-suspension.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

An explicit Margin of Safety (MOS) is incorporated into the TMDL by deducting 10% from the load capacity, or 12 tons of sediment (124 tons x 10%).

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

This TMDL was developed based on transparency that will result in attainment of targets on an average annual basis.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

A public informational meeting was held May 11, 2005 with the Greene County Conservation Board (GCCB) at their monthly meeting at the Milwaukee Road Depot in Jefferson, Iowa. The meeting included describing the Spring Lake impairment and the steps that were being taken to develop a plan to address the impairment. TMDL staff met again with GCCB staff on August 5, 2005 to visit of the lake and watershed and acquire a greater understanding of the water quality at Spring Lake. The draft TMDL was made available for public review and comment and a public meeting was held on December 20, 2005 in Jefferson, Iowa to discuss the draft TMDL. Comments received were reviewed and given consideration and, where appropriate, incorporated into the TMDL.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

Future monitoring is needed at Spring Lake to follow-up on the implementation of the TMDL. This monitoring will, at a minimum meet the minimum data requirements established by Iowa's 305(b) guidelines for a complete water quality assessment (3 lake samples per year over 3 years, 10 lake samples over 2 years, etc.). This data will be collected by 2010. Spring Lake has been included in the five-year lake study conducted by Iowa State University under contract with the IDNR. Although this lake monitoring program concluded in 2004, a lake monitoring program will be continued by the DNR. An effort is to be made in expanding the monitoring.

Reasonable assurance

Reasonable assurance only applies when reductions in nonpoint source loading is required to meet the prescribed waste load allocations.

The load allocation is set at zero. Reasonable assurance is not required.